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from their mouths the depth of the valleys, below the surface of the sea, sometimes did not exceed from 1,200 to 1,800 feet, but that beyond there was a greater increase of depth, within the last few leagues. In the fiords of Norway, merging into rapidly-contracting valleys, or headed by great vertical walls, hundreds of feet in height, may be seen the counterpart of the coast of the American continent just preceding the Plistocene period.

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## BOTANY.

**Botany at the Indianapolis Meetings.**—In the several meetings held in Indianapolis in August, including the American Association for the Advancement of Science, the Botanical Club, and the Society for the Promotion of Agricultural Science, there were many good papers on botanical subjects; in fact, it may be said that the average rank of the papers was considerably higher than in previous years. In the sessions of the Society for the Promotion of Agricultural Science the following botanical papers were read:

1. Preliminary Note on the Rotting of the Potato, by T. J. BURRILL; detailing experiments which show that in many cases, at least, the actual cause of the rotting is a *Bacterium* morphologically similar to *B. termo*, but differing from that species in its deportment towards nutrient media.

2. The Rots of the Sweet Potato, by B. D. HALSTED; indicating that there are four or five apparently distinct kinds of rots, due to the attacks of as many species of fungi.

3. Some Fungous Root Diseases, by L. H. PAMMEL; referring mainly to the cotton and sunflower plants.

4. The "Scab" of Wheat-Heads, by C. M. WEED; describing a disease of wheat which appears to be due to *Fusisporium culmorum*.

5. Some Recent Observations on the Black-Rot of the Grape, by B. T. GALLOWAY; detailing the results of experiments in inoculating the grape and Virginia creeper with ascospores, pycnidiospores, etc., of *Phyllosticta*.

6. A Comparative Test of Some of the Copper Preparations in the Treatment of Black-Rot of Grapes, by B. T. GALLOWAY; showing that by the use of such solutions the disease may be greatly reduced.

7. Biological Factors in the Nutrition of Plants, by M. MILES; referring to the rôle of micro-organisms in plant nutrition, and giving the results of experiments upon "clover tubercles."

8. The Forage Problem on the Plains, by C. E. BESSEY ; discussing the native grasses and the factors which control their distribution, and suggesting those worthy of cultivation.

9. Cucurbita an American Genus, by E. L. STURTEVANT. In this paper, after referring to the fact that Cogniaux, in his Monograph of the Cucurbitaceæ (1881), recognizes ten species, of which six are acknowledged to be strictly American, the author proceeds to show that the remaining species, viz. : *C. maxima*, *C. pepo*, *C. moschata*, and *C. ficifolia*, are also presumably of American origin. Six lines of argument seem to show that the position is well taken, viz. : (1) the absence of authentic instances of the recognition of pumpkins, squashes, etc., by the ancients of prehistoric times ; (2) the sequence of the European recognition which appears in the nomenclature seems to imply an introduction after the discovery of America ; (3) the vernacular names of the four species appear from historical evidence to have originated after the discovery of America ; (4) the vernacular names on structural grounds appear to be of American origin ; (5) herbarium specimens (very scanty in fact) indicate American as much as Old World origin ; (6) in the scanty notices by older writers on Asiatic plants these species appear, either by statement or implication, to be introduced.

The botanical papers read before Section F numbered twenty-seven in all, as follows :

1. The Forest Trees of Indiana, by STANLEY COULTER ; being a commentary upon the list of forest trees (106 species) of the State. The distribution appears to be dependent mainly upon the water supply, and not upon the richness of the soil, geological formation, or altitude above the sea.

2. Preliminary Notes Upon a New and Destructive Oat Disease, by B. T. GALLOWAY ; calling attention to a disease which attacks the leaves and stems of the oat, causing a discoloration of the tissues. A *Bacillus* was found, and this was shown by inoculations to be the cause of the disease, which appears to be widespread, cases having been reported from New England to Illinois and southward.

3. Observations on the Variability of Disease Germs, by THEOBALD SMITH ; citing certain variations by him in the bacilli of "hog cholera."

4. The Trimorphism of *Uromyces trifolii* (Alb. and Schw.) Wint., by J. K. HOWELL ; detailing investigations made to show that the *Æcidium* of clover (*Æ. trifolii-repentis*) is genetically connected with the teleutospore stage known as *Uromyces trifolii*. By means of care-

ful infections conclusive proof of the identity of the species was obtained.

5. Observations on the Life-History of *Uncinula spiralis* B. & C., by B. T. GALLOWAY; giving the results of a study of the germination of the ascospores.

6. On the Seed-Coats of the Genus *Euphorbia*, by L. H. PAMMEL. From a study of the structure of the seed-coats it is evident that distinguishing marks may be obtained from them.

7. Observations on the Method of Growth of the Prothallia of the Filicineæ, with Reference to their Relationships, by D. H. CAMPBELL. The author called attention to the similarity between the development of the prothallia of Filicineæ and the thalli of the Hepaticæ, and suggested that the two groups are genetically related.

8. Development of the Sporocarp of *Griffithsia bornetiana*, by V. M. SPALDING. A careful study of alcoholic material enabled the author to follow the development of the sporocarp step by step.

9. Contributions to the Life-History of Isoëtes, by D. H. CAMPBELL; giving many points in the development of the macrospore and the female prothallium. There are indications that Isoëteæ are related to the Marattiaceæ.

10. The Relation of the Mexican Flora to that of the United States, by SERENO WATSON; giving first a sketch of the physical features of the continent as they affect plant distribution, then recognizing and defining three botanical regions, viz.: the Atlantic, the Interior (Plains and Rocky Mountains), and the Pacific. After citing examples of families and genera the conclusion was reached that there is a closer connection between the Mexican flora and that of the Atlantic region than with that of either the Interior or Pacific.

11. Distribution of the North American Umbelliferæ, by J. M. COULTER. The Umbelliferæ of North America appear to be massed within the United States (especially northwestward), having spread southward from an Arctic and possibly from an Asiatic origin. The genus *Peucedanum* is the great North American umbelliferous group, and all its species are west of the Mississippi River, forty being peculiar to the Pacific States. *Cymopterus* is a Great Basin genus. The Great Plains contain but few species.

12. Distribution of the Hepaticæ of North America, by L. M. UNDERWOOD; referring to our meagre knowledge of our species (but 265 being known), and discussing as far as possible their general range. Four botanical provinces appear to be indicated for North America, viz.: Boreal, Medial, Austral, and Occidental, to which may also be

added the Mexican. The richest region in species is probably that extending from Washington southward along the coast, thence westward to Southern California.

13. The Migration of Weeds, by B. D. HALSTED; giving examples of the travels of some of the more common weeds of the country.

14. The Geographical Distribution of North American Grasses, by W. J. BEAL. Of the 298 genera of grasses we have 115, with 25 more introduced. Of the 3200 species in the world we have 850 natives, and 125 more introduced, making 975 in all, or considerably more than one-fourth of the whole. *Bouteloua* is represented by all its species (27), as is the case also with a number of smaller genera, many of which are peculiar to North America.

15. The Geographical Distribution of North American Cornaceæ, by J. M. COULTER. Of the three genera *Garriya* is peculiarly an American genus; its species are mainly Mexican, extending into the Pacific region. *Nyssa* is eastern. *Cornus* is doubtless of northern origin, which has, while moving southward, been separated by the Great Plains into a western and an eastern group.

16. The General Distribution of North American Plants, by N. L. BRITTON. The author divided the North American flora into a northern (British America, the Sierras, the Rocky Mountains, and the Alleghanies) and a southern region (Atlantic Coast, Mississippi Valley, and a part of California). Referring to the influence of the glacial climate, he pointed out many difficulties in the usual method of accounting for the present northern flora.

17. The Work of the Botanical Division of the Department of Agriculture, by F. V. COVILLE. Two main lines of work have been undertaken, viz.: (1) the study of economic problems, especially those relating to grasses and forage plants; and (2) systematic work upon the flora of the country. Publications in two series (economic and scientific) are made from time to time.

18. The Development and Function of the So-called Cypress "Knees," with a Consideration of the Natural Habitat of the Tree, by W. P. WILSON; showing by means of lantern slides the peculiarities of structure of the root-system of the cypress (*Taxodium distichum*) of the Southern States. Several methods of the formation of knees were fully illustrated and discussed. The conclusion was that the cause of their formation is physiological and not mechanical.

19. The Potato Scab, a Bacterial Disease, by L. H. BOLLEY. For want of time this paper was read before the Botanical Club.

20. The Continuity of Protoplasm Through the Cell-Walls of Plants, by W. J. BEAL and T. W. Tuomey; giving the results of a long series of observations.

21. Preliminary Note on the Genus *Rhynchospora* in North America, by N. L. BRITTON; being an enumeration of the species now known to inhabit North America.

22. On *Rusbya*, a New Genus of *Vacciniaceæ* from Bolivia, by N. L. BRITTON. An interesting new genus of parasitic plants.

23. Notes on a Monograph of the Genus *Lechea*, by N. L. BRITTON.

24. The Specific Germs of the Carnation Disease, by J. C. ARTHUR and H. L. BOLLEV; giving the results of a very complete study of the bacterium, which is shown to be the cause of the disease.

25. Notes Upon Plants Collected by Dr. Edward Palmer at La Paz, Lower California, by J. N. ROSE. Read by title only.

26. Notes Upon Crystals in Certain Species of the *Arum* Family, by W. R. LAZENBY; giving microscopical details of a study of the crystals.

27. Notes on *Isopyrum biternatum*, by C. W. HARGITT; giving the results of the anatomical study of the root-tubers.

The attendance upon the Botanical Club was very good, and the notes and papers were unusually numerous.

1. Dr. Britton, chairman of the club, in a short address upon the Present State of Systematic Botany in North America, noticed the activity in various centres by different investigators. A marked feature of the present is that there has lately been a great increase in the number of specialists.

2. Notes on Nomenclature, by B. E. FERNOW; referring to the need of a revision in both scientific and common names, and noting a considerable number of cases of recent changes in the scientific names of forest trees.

3. An Eastern Station for *Actinella acaulis* Nutt., by C. M. WEED; noting the occurrence of this western plant in Northern Ohio.

4. Notes on the Milky Juice of Plants as a Protection Against Stem-Borers, by C. M. WEED; concluding that the milky juice is a protection against stem-boring insects.

5. Notes on the Root-Tubercles of *Ceanothus americanus*, by W. J. BEAL; noting the occurrence of root-tubercles similar in appearance to those on clover.

6. The Genus *Bacterium*, by T. J. BURRILL; protesting against the loose practice in the application of names which prevails in bacteriology, and insisting that the genus *Bacterium*, which has latterly been ignored, has a right to existence.

7. A New Hollyhock Disease (*Colletotrichum althææ*), by E. A. SOUTHWORTH ; giving the results of studies of this destructive disease, with an account of germinations and inoculations.

8. The Nature of Paleæ and Lodicules in Grasses, by F. L. SCRIBNER ; discussing the homologies of the grass-flower and spikelet, and concluding (1) that paleæ are simply prophylla beginning the floral branch, and (2) that the lodicules are true scales belonging to the epidermal system, whose function is to expand the glumes in anthesis.

9. Two forms of *Ampelopsis quinquefolia*, by W. R. LAZENBY ; differing in the structure of their tendrils, developing discs in one (native form), and not in the other (cultivated form).

10. On Pollination in the genus *Æsculus*, by L. H. PAMMEL ; detailing the results of studies of several species.

11. Notes on the Adventive Buds of *Lycopodium*.

12. Notes on the Archegonia of Ferns.

13. Germination of the Spores and the Prothallia of *Osmunda*. Three papers by D. H. CAMPBELL, giving the results of careful structural studies.

14. Notice of a Descriptive List of the Junci of Texas, by F. V. COVILLE ; referring to the work done on Junci for the forthcoming Manual of the Texan Flora.

15. Apparatus for Vegetable Physiology, by J. C. ARTHUR ; showing drawing of some new apparatus made in the physiological laboratory of Purdue University.

16. Report on the Botanical Exchange Club, by F. V. COVILLE ; reporting that the club is now ready to make exchanges, having on hand about 5000 specimens.

17. Plant Colonists at Akron, Ohio, by E. W. CLAYPOLE ; giving a few notes upon certain common introduced plants in Northern Ohio.

18. A Serviceable Collecting Knife, by F. V. COVILLE ; being, in short, the "cotton knife" of the Southern States.

19. Double Flowers in Wild Morning Glory (*Convolvulus sepium*).

20. Peculiarities of the Pollen of *Epilobium palustre* var. *oliganthum*.

21. A Supposed Hybrid between *Tragopogon porrifolius* and *T. pratensis*. Three short papers by B. D. HALSTED.

22. A Mode of Spore Discharge in a Species of *Pleospora*, by Miss E. PORTER.

23. Potato Scab, by H. L. BOLLEY ; concluding that the disease is due to bacteria.

On Monday the club made an excursion to Garland Dell, locally known as "The Shades of Death," and had a most enjoyable time

throughout, collecting by the way many plants of interest to those less familiar with the central Indiana flora.

The officers of the club for the next year are: President, Wm. M. Canby; Vice-President, L. M. Underwood; Secretary, B. T. Gallo-way.

Taken all in all, the botanists of the country have no need of feeling ashamed of the quality of the work done in the association and the related societies.—CHARLES E. BESSEY.

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## ZOOLOGY.

**Heliotropism in Animals.**—Groom and Loob<sup>1</sup> think that the daily migrations of pelagic marine animals are to be regarded as caused by heliotropism. In the day-time this is negative, the strong light driving them from the surface; while at night it exercises a positive action, causing them to seek the surface waters. Their observations show that light, and not heat, is the exciting cause. Driesch finds<sup>2</sup> that heliotropism influences the growth of the hydroid *Sertulariella*.

**Excretory Organs of Protozoa.**—A. B. Griffiths states<sup>3</sup> that he has proved the existence of uric acid in the contractile vacuoles of *Amœba*, *Vorticella*, and *Paramecium*. The *Amœba* was killed under the cover-glass with weak alcohol. This was followed by nitric acid, the slide warmed, and then ammonia was drawn under the cover-glass, the result being the formation of crystals of murexide in the contractile vacuole itself, as well as in its excretion. This clearly shows that these organs are for the excretion of nitrogenous waste.

**Note on Some Gigantic Specimens of *Actinosphærium eichhornii*.**—In a small pond near the observatory of the State University of Iowa I collected some material which now stands on a table in the laboratory. Minute whitish discs, plainly visible, however, to the unaided eye, may be seen in considerable numbers clinging to the stems and leaves of *Ceratophyllum*. An examination of these discs reveals the fact that they are gigantic Rhizopods belonging to the genus *Actinosphærium*. *Actinosphærium eichhornii* they probably are, but they are vastly larger than any individuals of this species usually

<sup>1</sup> *Biol. Centralblatt.*, X., 160 and 219.

<sup>2</sup> *Zoolog. Jahrbuch.*, V., p. 147.

<sup>3</sup> *Proc. Roy. Soc. Edinburgh*, XVI., p. 131.